



# **RANI CHANNAMMA UNIVERSITY, BELAGAVI**

WEL-COME

TO THE COURSE STRUCTRE AND SYLLABUS OF UNDERGRADUATE  
PROGRAMMES – **B.Sc**

**III Semester**

# Syllabi for Faculty of Science and Technology under

**B.Sc**

**III – Semester**

**Group – I (LANGUAGES)**

## **1. Basic – English:**

**Detailed Syllabus for B. Sc. / B.Sc. Comp-Sc / BCA / B. Sc. in CCJ  
(With effect from 2017-18 onwards)**

**Semester III: Basic English  
Teaching Hours: 5 per Week**

**Text: Eco English: Learning English through Environmental Issues  
an Integrated, Interactive Anthology**

Edited By N. Krishnaswamy, Lalitha Krishnaswamy, and Dr. B.S. Valke. Bloomsbury  
Publication

(Units – 2, 3, 7, 8, 10, 13, 14, 15)

### **Grammar and Composition**

Confusing Words (Sentences to be framed on Five pairs of  
words) One Word Substitutes

Interpretations of Notices

Translation of a Paragraph (A Paragraph of one hundred words  
from Kannada text into English or vice versa)

Paraphrasing of a Prose of 100 words or a Sonnet

### **Pattern of Question Paper**

(80 Marks per paper of three hours and 20 Marks for I.A)

- |  |         |
|--|---------|
| 1) Objective type questions  | 10x1=10 |
| 2) Comprehension Questions (Answer in a sentence or Two)           | 5X2=10  |
| 3) Essay type question (one out of two)                            | 1X10=10 |
| 4) Essay type question (one out of two)                            | 1X10=10 |
| 5) Short Notes (two out of four)                                   | 2X5=10  |
| 6) Confusing Words (Sentences to be framed on Five pairs of words) | 10      |
| 7) A) One Word Substitutes   | 5X1=05  |
| B) Interpretations of Notices                                      | 5X1=05  |
| 8) Translation (100 words)   | 1X10=10 |

Or

Paraphrasing of a Prose of 100 words or a Sonnet

**80**

## MIL – (Modern Indian Languages)

### Additional English

Detailed Syllabus for B. Sc. / B.Sc. Comp-Sc / BCA / B. Sc. in  
CCJ (With effect from 2017-18 onwards)

Semester III: Additional English  
Teaching Hours: 5 Hours per Week

**Text:** *FINAL SOLUTIONS: A Play* by Mahesh Dattani (Penguin Books)

#### Grammar and Composition

- i) Determiners (Some/any/no/none/any/much/many/little/few/a lot/plenty/all/all of/ most/most of//all/every/whole /each/every etc.)
- ii) Adjectives and adverbs (making Sentences using adj and adv)
- iii) Futurity in English
- iv) Phrasal Verbs (Making sentences using phrasal verbs)
- v) Concord

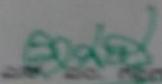
#### Pattern of Question Paper

(80 Marks per paper of three hours and 20 Marks for I.A)

- |   |          |
|---|----------|
| 1) Objective type questions on the play   | 10X1= 10 |
| 2) Comprehension Questions on the play  | 5X2=10   |
| 3) Essay type question on the play (one out of two)   | 1X10 =10 |
| 4) Essay type question on the play (one out of two)   | 1X10=10  |
| 5) Short Notes on the play (two out of four)  | 2X5=10   |
| 6) a) Determiners   | 5X1=05   |
| b) Use of Adjectives and Adverbs<br>making sentences using adjectives and adverbs given<br>(5 out of 7) | 5X1=05   |
| 7) Futurity in English  | 10       |
| 8) a) Phrasal Verbs<br>making sentences using Phrasal Verbs<br>(5 out of 7)                             | 5X1=05   |
| b) Concord  | 5X1=05   |

**80**

## 2. Basic –Kannada

<b>ಸಾಹಿತ್ಯ ಕೌಮುಡಿ-೨</b> <b>ಬಿ.ಎಲ್.ಓ. ತರಗತಿಗಾಗಿ ಮೂರನೆಯ ಸೆಮಿಸ್ಟರ್</b> <b>ಅಭ್ಯಾಸ ಕನ್ನಡ ಪಠ್ಯಕ್ರಮ</b> <b>ಪಠ್ಯ ಛಾಟ</b>	
೧. ಪದ್ಯಂ ಸಮಸ್ತ ಜನತಾ ಪದ್ಯಂ	-ಶ್ರೀವಿಜಯ
೨. ಛಾಂದಸ್ ಪದ್ಯ	-ರತ್ನ
೩. ಕನ್ನಡಿಗರ ಜಾಯ	-ಎಂ. ಗೋವಿಂದ ಪೈ
೪. ಪ್ರವೃತ್ತಿ ಉತ್ತರ	-ಕೆ. ಎಲ್. ನರಸಿಂಹಸ್ವಾಮಿ
೫. ಪದ್ಯ	-ಕೆ. ಎಲ್. ಶಿವಶಂಕರ
೬. ಧಾರವಾಡದಲ್ಲಿದ್ದ ಮಳೆಗಾಲ	-ಚಿನ್ನಪ್ಪರ ಕಾವಿ
೭. ನಿನ್ನೊಡವೆಯನ್ನು ನಿನ್ನೊಡವೆಗಾರ	-ಕೆ.ಎಲ್. ನಿಜಾರ ಅಪ್ಪಪ್ಪ
೮. ಕನ್ನಡ ಪದ್ಯ ರಚನೆ	-ಆದ್ಯರಂಗಯ್ಯ
<b>ಗದ್ಯ ಛಾಟ</b>	
೯. ನಮ್ಮ ಮನೆಯ ರೀತಿ	-ಡಾ. ಪಾ. ಮಾ. ನಾಯಕ
೧೦. ಕನ್ನಡ ಜಗತ್ತು	-ಅ.ಡಾ. ಮಿತ್ರ
೧೧. ಬೇರೂರಿನ ಪೆಟ್ಟುಗಳು	-ಪಿ.ರಾಮಲಕ್ಷ್ಮಣ ಕುಕ್ಕರಾಜ್
೧೨. ನನ್ನ ಅಪಂಜರ	-ಡಾ. ಎಂ. ಧಾರವಾಡಕರ
೧೩. ಪರರ ಚಿಂತೆ ನಮಗೇಕೆಂದಿ	-ವಿಶೇಷಣ್ಣ ಸಂಪ
೧೪. ಇಂದ್ರಿಯದಲ್ಲಿದ್ದ ಧಾರವಾಡಿಯರು	-ನಿರಂಜನ ಗೋವಿಂದರಾವ್
೧೫. ಪದ್ಯರಚನೆಯಂತೆಯೇ ನಮಗೇಕೆಂದಿ	-ವಿ.ಕೆ. ಗೋಕಾಕ
೧೬. ನಿನ್ನೊಡವೆ ಎಂದಿರಬೇ?	- ಡಾ. ಪಾಟೀಲ ಮಲ್ಲಪ್ಪ
 (ಡಾ. ಎಲ್. ಎಂ. ಗೋವಿಂದರಾಯ್) ಅಧ್ಯಕ್ಷರು ಕನ್ನಡ ಅಭ್ಯಾಸ ಮಂಡಳಿ (ಯು.ಜಿ)	

### **3. Basic – Marathi**

**B.Sc**

**Semester III**

**Basic Marathi**

**(With effect from 2017-18 onwards)**

**Course: Literary Form: Novel**

**Text: Banagarwadi : Vyankatesh Madagulkar**

Mehata Publication, Pune

### **4. Basic Arabic:**

#### **SYLLABUS OF ARABIC SUBJECT**

**BSc. Third Semester**

**Arabic Basic**

**(With effect from 2017-18 onwards)**

**Paper :** Prose, Poetry and History of Arabic

Literature **Scheme of teaching :** 5 hours per week

#### **Prescribed Text Books**

**1. Al Qiraatur Raashida part II**

**(Prose)** By: Abul Hasan Ali Nadvi

Pub.By: Nadvatul Ulama Lucknow (u.p)

Following Lessons

- (1) Kisratum minal Khubzi. (2) Eyaadatul Mareezi (3) Al keemiyau (4) yaomun Saaifun (5) An Nazafatu (6) Kun Ahadas sab-ati ( i) (7) Kun Ahadas sab-ati (ii)

## 2 Qaseeda-e-Burdah (Poetry)

By: Imam Boosary

Pub. By: Azeem Book Depo Deoband (u.p)

Chapter No.5.

## 3. Mukhtasar Tareekh-e- Adabiyat-e-Arabi

By: Dr. syed Abul Fazl Pub. By: Deccan

Traders Book Seller

& Publisher 23-2-378, Moghalpura, Hyderabad.

Chapter No. III 1st & 2nd period (daur)

## 4 The Holy Quraan. Pub. By: Taj Company

Mumbai Suratul Alaq

The question paper should be broadly based on the following pattern.

1) Multiple choice from first and second text	10x1	= 10
2) Summary from first text with choice	2x7½	= 15
3) R.C. from first text with choice	3x5	= 15
4) Appreciation of verses from second text 2 out of 3	2x7½	= 15
5) Question from third text with choice	2x7½	= 15
6) Question on Sura	1x10	= 10

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**80**

## 5. Basic - Urdu:

### B. Sc III SEMESTER

#### URDU BASIC (MIL)

(With effect from 2017-18 onwards)

**Paper III:** Prose, Poetry & Science Essays

**Scheme of Teaching:** Duration 16 weeks, 5 hours/week

#### Prescribed Text books

##### *I. KARWAN-E-ADAB*

(Detailed Text book)

Ed by: Dr. Sayed Sanaula

Published by: Nasheman Publishers Near  
Ikhlas English School 2<sup>nd</sup>  
Stage RML Nagar  
Shimoga.

**PROSE:** (First 5 lessons only)

- |                                    |                     |
|------------------------------------|---------------------|
| 1. Binte Bahadur Shah-             | Khwaja Hasan Nizami |
| 2. Khutoot-e-Ghalib-               | Mirza Ghalib        |
| 3. Kafan-                          | Premchand           |
| 4. Faiz Ahmed-                     | Mujtaba hussain     |
| 5. Savere jo kal meri aankh khuli- | Patras              |

**POEMS:**

- |                       |                    |
|-----------------------|--------------------|
| 1. Qaidkhane ki raat- | Mir Anees          |
| 2. Ata Dal-           | Nazeer Akbar Abadi |
| 3. Jadeed Taraqiyaat- | Haali              |
| 4. Zamana-            | Allama Iqbal       |

## **GAZALS:**

- |                     |                       |
|---------------------|-----------------------|
| 1. Piya Baaj pyala- | Mh. Quli Qutub Shah   |
| 2. Hasti Apni-      | Mir Taqi Meer         |
| 3. Layi Hayat-      | Ibrahim Zouq          |
| 4. Badhao-          | na Aapas- Hali        |
| 5. Chupke-          | Chupke- Hasrat Mohani |

## ***II. JADEED-ILM-E-SCIENCE***

By: Wazarat Hussain  
Pub By: Educational Book  
House, Aligarh 202002

(Following lessons only)

**Lesson no. 6, 7, 8 & 9**

**(Page No- 131 – 197)**

## 6. Basic Sanskrit:

<b>Bsc Part -II</b>		
<b>Basic - Samskrit</b>		
<b>Third Semester</b>		
Teaching Hours	:	5 Hours per week
Exam Marks	:	80+20=100 of 3 hours Duration
Text : सुनीति सुधानिधि: (112 Verses)Mahatee Publication Dharwad 1		
	(नपुसकशब्दाE)	Marks
1.		:70 -
2.	Grammer	:10 Marks
3.	Internal Assessment	:20 Marks
	1. Internal Test 14 2. Assignment, Class Records Skill	
	Development - 06	<b>Total 100 Marks</b>

### **Bsc Part -II**

### **Basic - Samskrit**

#### **Question Paper Pattern**

#### **Third Semester**

1.	Select the correct answer (any ten out of twelve)	10 Marks
2.	Translate & explain (any three out of six)	15 Marks
3.	Explain with reference to context (any four out of six)	16 Marks
4.	Essay type question (with internal choice)	14 Marks
5.	Short notes (any three out of five)	15 Marks
6.	Grammar (Neuter genders)	10 Marks
	<b>Total</b>	<b>80 Marks</b>

## 7. Basic - Persian:

### III Semester BSc

Scheme of teaching(5 hours per week)

Modern Prose...

1. Prescribed textbook

Following portion only

Rah-E-Nu Hussain

Kazim

zada. Textbook

Sukh-ne-naw by Dr.Gulam Sarwar

Pub:-Educational book house Muslim university market Aligarh(U.P).

**Classical Poetry...**

2. Prescribed textbook

Following portion only

Rubiyat

Qta-E-Yat.

Textbook

— Nisab-E-Farsi by Dr.Aaftab Akhtar Razvi and Prof M.M. Jalali

Pub:-Shanaz publishing Shamat ganj Barelli(U.P)

## **Scheme of Examination**

1. Total marks-100 Theory -80 marks Internal test Assessment 17 and attendance 3 marks=20.

2. In each paper two tests shall be conducted for the award of Internal

Assessment marks, and each of one hour duration for a maximum of 20 marks reduced to 17 later. First test shall be conducted in 8<sup>th</sup> week and 2<sup>nd</sup> test in 12<sup>th</sup> week of respective semester. The Average marks obtained in the two tests for 17 marks shall be taken as final Internal Assessment Marks test component.

### Scheme of Examination

Q1. Multiple choice questions	1*10=10
Q2. Essay type questions from the text	3*05=15
Q3. Questions on R.C from the text	3*05=15
Q4. Translation & Explanation from the text	3*05=15
Q5. Summary of the Passage/Poem from the text with choice	1*15=15
Q6. Short notes with choice (On the history of Persian Literature)	2*05=10

## 8. Basic - Hindi

Syllabus for B.Sc./B.C.A - III & IV Semesters from the  
academic year 2017-18 onwards-

B.Sc. III<sup>rd</sup> Semester

Basic: Hindi

1) Examination : a) One Paper carrying 80 Marks and 3 hours of Duration.

b) Internal Assessment Marks 20

2) Teaching : 5 hours per week

3) Course :1) Drama

2) Translation – From Kannada/English in to Hindi

4) Distribution of Marks

<b>I</b>	Objective type of Questions 10/14	10 Marks
<b>II</b>	Annotations from Drama 2/4	10 Marks
<b>III</b>	General questions based on Drama 2/4	30 Marks
<b>IV</b>	Short Notes on Drama 3/5	15 Marks
<b>V</b>	Translation	15 Marks
	Total	80 Marks
	Internal Assessment	20 Marks
	Total	100 Marks

## Text Books-

1) Drama (नाटक)

MARKS: 65



राधाकृष्ण काशण ाइवेटल मटेड



७/३१ अ सार माग , द रयागंज,नई द -ल११०००२

2) TRANSLATION (अनवाद)

MARKS: 15

## Reference Books

१. मो नराके शऔर उनका सा ह :य डॉनीलमफा खी
२. ह दनाटक :ब चन संह
३. मो नराके शऔर उनके नाटक : गर रश तो ग
४. वातं योतरनाटक : मू संय मणः योती व र म
५. भारतीय ना य- वमशः जयदेवतनेजा  
दनाटक और ना यसमी
६. ह ा : डॉ. नारायण राय
७. ह दके मखनाटककारु के नाटको म लोकत वः स यवीर संहभो रया
८. अनवादु व ानः भोलानाथ तवार
९. अनवादकु , तकनीकया और सम याँः ाीनारायण समीर

# Group – II

## OPTIONAL / COMPULSORY SUBJECT FOR THE DEGREE IN SCIENCE SUBJECTS

Science Subjects: (any three subject of equal importance to be chosen as per the grouping given by Rani Channamma University, Belagavi)  
DETAILED SYLLABUS OF FOLLOWING PAPERS WITH PRACTICALS

### 1. BOTANY (optional)

#### B.Sc. III Semester (w.e.f: 2018 – 19) and onwards.

##### Subject: BOTANY (optional)

<b>Paper:- Diversity of Cryptogams (Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms).</b>	<b>52 Hrs</b>
<b>Unit I: Algae</b>	<b>10 hrs.</b>
General characters, Pigmentation, Classification by Fritsch (up to class level). Distribution, thallus structure, reproduction and life cycle of Nostoc, Volvox, Oedogonium, Sargassum and Batrachospermum. Economic importance.	
<b>Unit II: Fungi</b>	<b>08 hrs.</b>
General characters, Classification (Alexopoulos's system). Distribution, Structure, Reproduction and life cycle of Albugo, Rhizopus, Penicillium and Puccinia. Economic importance of fungi. General account of lichens.	
<b>Unit III: Plant Pathology</b>	<b>06 hrs.</b>
General account of Bacteria and Viruses. Introduction and general symptoms of plant diseases. Symptoms, Pathogens and control measures of Late blight of potato, White rust of crucifers, Tikka disease of ground nut.	
<b>Unit IV: Bryophytes</b>	<b>06 hrs.</b>
General characters, Classification (Smith). Structure, reproduction and schematic life cycle of Riccia, Anthoceros and Funaria. (Developmental details are not expected). Evolution of sporophytes.	
<b>Unit V: Pteridophytes</b>	<b>10 hrs.</b>
General characters and classification. Distribution, Structure (External and Internal) and Reproduction of Psilotum, Selaginella, Equisetum and Nephrolepis (Developmental details are not expected). Stellar evolution. Heterospory and seed habit	
<b>Unit VI: Gymnosperms</b>	<b>08 hrs.</b>
General characters and classification. Distribution, Structure (External and Internal) and Reproduction of Cycas, Pinus and Gnetum (Developmental details are not expected).	
<b>Unit VII: Paleobotany</b>	<b>04 hrs.</b>
Geological time scale, fossilization-molds, Impression, Petrification and cast. Study of fossils - Calamitis, Lepidodendron, Lygenopteris.	

## B.Sc. III Semester PRACTICALS

**Total number of hours per week: 04, Internal Assessment=10 Marks, Max Marks: 40 Marks**

1. Vegetative and reproductive structures of Nostoc, Volvox and Oedogonium.
2. Vegetative and reproductive structures of Sargassum and Batrachospermum
3. Vegetative, reproductive structures and disease symptoms of Albugo, Rhizopus and Penicillium.
4. Vegetative, reproductive structures and disease symptoms of Puccinia. Lichens
5. Study of Vegetative and Reproductive structures of Riccia, Anthoceros and Funeria.
6. Study of Vegetative and Reproductive structures of Psilotum and Selaginella.
7. Study of Vegetative and Reproductive structures of Equisetum and Nephrolepis.
8. Study of Vegetative and Reproductive structures of Cycas, Pinus and Gnetum.
9. Disease symptoms and control measures of Late blight of potato, Black rust of Wheat, Tikka disease of ground nut.
10. Paleobotany- Study of fossils Lepidodendron, Calamitis, Lygenopteris.
11. Field visits.

### Suggested Readings:

Smith G.M.1971 vol 1 Algae and fungi. Tata McGraw HILL Publishing company New Delhi  
Sharma O.P. 1992 Text book of thallophytes McGraw Hill Publication  
Sharma P.D. 1991 The fungi Rastogi and Co Meerut  
Dubey H.C.1990An Introduction to Fungi Vikas Publishing House Pvt Ltd Delhi Clifton, A 1958 Introduction to Bacteria McGraw Hill and Co New York  
Basu A.N.1993 Essentials of plant viruses, vectors plant diseases New Age International New Delhi.  
Chopra G.L. A text book of algae Rastogi and co Meerut  
Rangaswami G 1998 Diseases of crop plants in India. Prentice Hall of India New Delhi.  
Sunderrajan S 1997 College Botany Vol 1. S. Chand and Co Ltd New Delhi  
Alexopoulos, 1992 An Introduction to Mycology. New Age International. New Delhi  
Vashista B.R. 1978 Fungi. S. Chand and co. Ltd. New Delhi

### B.Sc. III Semester Botany Practical Examination

**Time: 4 Hours**

**Max Marks: 40**

Q1: Identify and classify specimens <b>A, B, C</b> giving reasons.	09 marks
Q2: Identify and explain the internal structures of specimen <b>D</b> and <b>E</b> with the neat labelled diagrams (Show the preparation to the examiner)	10 marks
Q 3: Identify & describe the salient features in the slides/ specimens <b>E, F, G, H, I</b> and <b>J</b>	12 marks
Q4: Identify & describe the salient features in the fossil specimen <b>K</b> .	03 marks
Journal	04 marks
Field visit report	03 marks

**B.Sc III Semester Practical Examination**

**Subject: Botany**

**Instructions to Examiners.**

Q.1. Specimens <b>A, B, C,</b> (One each from Algae, Fungi, Bryophyte specimens mentioned in practical syllabus. Identification -01 mark, classification-1 mark, salient features- 1 mark	09 marks
Q. 2. Specimens <b>D and E.</b> (One each from Pteridophytes and Gymnosperms. Identification -1 mark, Preparation & description – 2 marks, diagram-2 marks).	10 marks
Q.3.Specimen <b>F, G, H, I, J and K</b> (One each from Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms and Pathology- Identification-1/2 mark, description-1 and 1/2 marks).	12 marks
Q.4. Fossil Specimen/ Slide <b>L</b> (Identification ½ mark, description -1.5 marks)	2 marks
Journal	4 marks
Field visit report	3 marks

**B.Sc.III Semester Theory Examination**

**Sub: BOTANY**

**Pattern of Question Paper**

**Time: 03 hours**

**Max. Marks: 80**

All questions are compulsory

**Q. I Answer any ten out of twelve (01 to 12 sub questions) 10 X 2 = 20**

From Unit I Algae: 03 Sub questions, From Unit II Fungi: 02 Sub questions,  
From Unit III Pathology: 01 Sub question, From Unit IV Bryophytes: 01 Sub question,  
From Unit V Pteridophytes: 03 Sub questions, From Unit VI Gymnosperms: 01 Sub question,  
From Unit VII Paleobotany: 01 Sub question.

**Q.II. Answer any six out of eight (13 to 20 sub questions) 6X 5 = 30**

From Unit I Algae: 02 Sub questions, From Unit II Fungi: 01 Sub question,  
From Unit III Pathology: 01 Sub question, From Unit IV Bryophytes: 01 Sub question,  
From Unit V Pteridophytes: 01 Sub question, From Unit VI Gymnosperms: 01 Sub question,  
From Unit VII Paleobotany: 01 Sub question.

**Q. III Descriptive Answers.**

- |                            |           |                           |                    |
|----------------------------|-----------|---------------------------|--------------------|
| 21. From Unit I Algae      | <b>OR</b> | From Unit II Fungi        | <b>1 X 10 = 10</b> |
| 22. From Unit V Bryophytes | <b>OR</b> | From Unit V Pteridophytes | <b>1 X 10 = 10</b> |
| 23. From V Pteridophytes   | <b>OR</b> | From VI Gymnosperms       | <b>1 X 10 = 10</b> |

**Note:** - Minor changes in the Question Paper Pattern is permitted, with respect to the teaching hours allotted for each topic.

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## 2. BIOTECHNOLOGY (Optional)

(w.e.f 2018-19)

### BT: 3.1 – MICROBIOLOGY AND IMMUNOLOGY

Total hours allotted: 50

#### PART A – MICROBIOLOGY

Total hours allotted: 25

**1. Introduction and scope of Microbiology:** Historical perspective, importance and scope of microbiology as a modern Science, Branches of microbiology.

(02Hrs)

**2. Microbial techniques:**

(06Hrs)

A) Sterilization:

Physical, chemical and radiation method of sterilization, principle and application.

B) Microscopy:

Phase contrast and electron microscope.

C) Stains and staining techniques:

Principles of staining, types of staining- Simple, Differential and structural Staining concept.

**3. Ultra structure of Viruses and Bacteria:**

A. VIRUSES – Structure and classification Plant Viruses – CaMV Animal Viruses – Hepatitis B Bacterial Viruses – Lambda phage B. BACTERIA – Ultra structure of a bacterial cell, cell wall, endospore and capsule

(06Hrs)

**4. Culture of microorganisms:**

(04Hrs)

Culture media, types of culture media, isolation of microorganisms by Different methods, preservation and maintenance of culture.

**5. Microbial growth:**

(03Hrs)

Nutritional requirements of microorganisms, Bacterial growth curve, Factors affecting growth

**7. Pathogenic microorganisms:**

(04Hrs)

a) Bacterial diseases of man- Tetanus, Tuberculosis and Cholera.

b) Viral disease – AIDS (HIV).

PART B – IMMUNOLOGY 25 hrs

**1. Introduction to immunology:** History and scope of Immunology. (02Hrs)

**2. Immunity:** (04Hrs)

Types of immunity – Innate, Active, Passive and Acquired, Humoral and Cell Mediated Immunity.

**3. Cells of immune system:** Lymphoid cells, T & B lymphocytes (04hrs)

**4. Organs of immune system:** (02Hrs)

Bone marrow, Thymus, Lymph node and spleen.

**5. Antigens:** (02Hrs)

Types, Haptenes, Epitopes, Paratopes, Effector Phase, and Blood group Antigens.

**6. Antibodies (Immunoglobins):** (04Hrs)

Structure, theory of antibody formation, types, properties and functions of Immunoglobins and MHC.

**7. Antigens- Antibody reactions:** (04Hrs)

Mechanism of precipitation, Agglutination, Complement fixation,

**8. Immuno-blotting techniques:** Immuno-Fluorescence, RIA and ELISA. (03Hrs)

**BIT: 3.2 MICROBIOLOGY AND IMMUNOLOGY**

1. Safety measures in microbiology laboratory.

2. Cleaning and sterilization of glassware's.

3. Study of instruments: Compound microscope, Autoclave, pH, laminar airflow and centrifuge.

4. Media preparation: Nutrient agar, Nutrient broth and Potato dextrose agar.

5. Isolation of bacteria and fungi from soil, air and water-dilution and pour plate method.

6. Inoculation techniques: stab, point, streak, pour plate and spread plate.

7. Bacterial staining technique – Simple and Differential (Gram's).

8. Counting of microorganism – Total count (Haemocytometer).

9. Biochemical tests: Starch hydrolysis, Catalase, Gelatin liquification.

10. Antibiotic sensitivity test – Paper disc method.

11. Preparation of serum.

12. Total RBC and WBC count.

13. Estimation of hemoglobin content in blood.

14. Demonstration of ELISA and RIA.

15. Diagnosis of infectious disease by immunoassay Widal test for Typhoid and Wassermann

Reaction for syphilis.

16. Rocket Electrophoresis.

## References:

### MICROBIOLOGY

1. Ananthanarayanan, R. Jakarta Panikar, C.K.1997: textbook of microbiology. Orient Longman Chennai
2. Aneja, K.R.1997: Experiments in Microbiology Plant Pathology and tissue culture.
3. Atlas, R.M. 1998: Microbiology, Fundamentals and applications 2nd Edition McMillan Publishing Co.New York.
4. Auro, P.T. Kapoor, K. K. Yadav, K.S. 1996: An introduction to Microbiology, New Age International Pvt. Ltd.
5. Gerharot, P.Murry, R.G Wood, W.A. and kreig, N.R 1994: Methods for general and molecular bacteriology, American Socitey for Microbiological Washington DC.
6. Kumar, H.D. and Swati kumar 1998: Modern Concept of Microbiology, Vikas Publishing House Pvt.Ltd, New Delhi
7. Pecleczar Jr., M.,J. Chan, E.U. and kreig, , N.R 1993 : Microbiology McGraw Hill Inc. New York.
8. Prescott, L.M.Harley, J.P. and Kiein, D.A. 1996: Microbiology WMC Brown Publisher.
9. Purohit S.S.1997-98: Microbiology, Agrobotanica Bikaner.
10. Schlegal H.G. 1993: General Microbiology, 7th Ed., Cambridge University Press.
11. Sharma P.D.2001: microbiology, Rastogi Publication, Meerut.
12. Stainer. R.Y., Ingraham, J.L.,Wheelis, M.L., and Painter P.R. 1992: General microbiology, Mcmillian Publication Ltd., London.
13. Sundarajan S.1999, College microbiology, Vardhanan Publication, Bangalore.
14. Modern concept of Microbiology: H.D. Kumar & Swati Kumar
15. A text book of Microbiology: Dubey & Maheshwari
16. Microbial ecology fundamentals and application: Atlas Bartha
17. Fundamentals of Microbiology & Immunology: A.K.Banerjee,Nirmalya Banerjee
18. General Microbiology Vol. I & II-Power & Dangiwala
19. Microbiology, Prescott, Harley & Klein.
20. Alcamo's Fundamental of Microbiology, (2004); Pommerville et al.

21. Microbiology (1996); Prescott, Harley & Klein
22. Microbiology (2004); Tortora,F.
23. Foundation in Microbiology (1996);Talaro & Talora.
24. Food Microbiology (2004); Adam , M.R.
25. Principles of Microbiology (1994); Atlas,R.M.
26. Pharmaceuticals Microbiology (2003); Purohit & Saluja.
27. Microbiology: A Lab Manual, Cappuccino et al.
28. Brock Biology of Microbiology, Martinko,M.T & Parker,J.
29. Microbial Biotechnology (1998) Glazer & Nikaido

### **IMMUNOLOGY:**

1. Abbas A.K., Litchman A.H and Pber J.S.1994: Cellular and molecular immunology, 2nd edition , W.C.Brown Publishers.
2. Abdul.K.Abbas, Litchman A.H and Pber J.S.2000: Cellular and molecular immunology, 4th edition ,W.C. Brown Publishers.
3. Charles A.Janeway, Paul Travers, Mark Walport,2001: Immunology, Garland publishing, New York.
4. Cobman. R.M., Lambard M.F., and Sieard R.E.1992: Fundamental immunology, 2nd Edition, W.C.Brown Publishers.
5. Eli Benjamin, Richard Coiro, Gerfferey Sunshine, Hyde R.m.1992, Immunology, 2nd edition, Willeans and Wilkins Baltimore.
6. Essentials of Immunology – Roitt
7. Immunology – a short course, 4th edn, Wiley liss.
8. Immunology 3rd Ed. (1997) – Kuby J.
9. Immunology – An Introduction (2004) –Tizard, I.R., Thompson Pub.
10. Immunology – Roitt.
11. Jack Chirikjiou 1995: Biotechnology, theory and techniques, Plant biotechnology, Animal cell culture,
12. Immunobiotechnology (Vol I) Jones and Barlet Publishers, 40 Tall Pine Driver, studbury.
13. Joshi K.R. and Osama N.O. 1998 Immunology Agro Botanica Bikoner.
14. Richard A.Gldsby, Thomas J, Kindth Barbara 2000: Immunobiology, W.H.Freeman and company, NewYork.
15. Tiyard Fon R 1992: Immunology- an introduction, Philadelphia, Saunder college Publishing.

16. Warren L.Ernest, 1994: Medical microbiology and immunology ( 4th Edn),  
Appletal and Lange,Staford.
17. William E.Paul 1989: fundamental Immunology, 2nd Edn., Rav Prew, New  
York.
18. William R.Calrk 1991 : the experimental foundation of modern immunology,  
4th edn., John Wiley and Son, New York.
19. Principle & Practice of Immunoassay 2nd Ed. – Christopher & David
20. Principles of Immunology: Shastri
21. Fundamentals of Microbiology & Immunology : Banerjee& Banerjee
22. Biotechnology : Mohan P.Arora
23. Immunology : Rao
24. Biotechnology : Satyanarayan

**RANI CHANNAMA UNIVERSITY, BELAGAVI.**

**B.Sc Biotechnology Practical Examination**

**III Semester –3.2 Microbiology & Immunology**

**Time: 04 hrs**

**Max. Marks – 40**

Q.No I. Estimate the amount of Hemoglobin / RBC / WBC / Explain the principle &  
Procedure.

**15 Marks**

Q No.II. Make a temporary stained Preparation from the given sample; add a note on  
principle & procedure/Counting of microorganisms

**10 Marks**

Q. No.III. Write the Principle & Application of Rocket Electrophoresis / ELISA /  
RIA / Laminar air flow / PH meter / Centrifuge / Autoclave / Hot air oven.

**05 Marks**

Q.No.IV. Journal

**05 Marks**

Q.No.V. Viva –voce

**05 Marks**

## B.Sc Degree Examinations

### Biotechnology

#### B.Sc. Biotechnology Theory Question Paper Pattern

Time: 3 Hrs

Max. Marks: 80

Q.No.I. Answer any **TEN** of the following

2X10= 20

- 1)
- 2)
- 3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)
- 10)
- 11)
- 12)

Q.NO.II Answer any **FOUR** of the following

4X5= 20

- 13)
- 14)
- 15)
- 16)
- 17)
- 18)

Q.No.III. Answer any **FOUR** of the following

4X10= 40

- 19)
- 20)
- 21)
- 22)
- 23)

### 3. CHEMISTRY (Optional)

TEACHING HOURS : 50 HOURS

#### INORGANIC CHEMISTRY

##### Metallurgy

09 hours

Review of steps involved in metallurgical process, thermodynamic concepts of selection of reducing agents using Ellingham diagrams, relative efficiency of carbon and carbon monoxide as reducing agent.

Reducing agents for Chromic oxide and zinc oxide.

Extraction of nickel by Mond's process, lead by carbon reduction process, aluminum from bauxite.

Powder metallurgy - Production of tungsten powder from wolframite.

##### Solvents

04 hours

Types, properties of good solvents, non-aqueous solvents - Liquid  $\text{NH}_3$  and liquid HF, (properties like solvation, acid-base, redox, complex formation and precipitation), water as universal solvent, leveling effect.

##### Acids and Bases

04 hours

Arrhenius, Bronsted-Lowry, Lux-Flood, solvent system and Lewis concepts of acids and bases. Hard and soft acids and bases(HSAB) - classification of acids and bases as hard and soft, Pearson's HSAB concept,

#### ORGANIC CHEMISTRY

##### Orientation

03 hours

Review of inductive, electromeric, resonance and hyperconjugation effects, activating and deactivating groups, orientation of substituent in aromatic compounds with different functional groups like  $-\text{OH}$ ,  $-\text{NH}_2$ ,  $-\text{Cl}$ ,  $-\text{NO}_2$ ,  $-\text{CH}_3$ , and  $-\text{COOH}$  in halogenation and nitration reactions (only electronic interpretation)

##### Alcohols

04 hours

Introduction and nomenclature of dihydric and trihydric alcohols, preparation of glycol from ethene, oxidative cleavage of ethylene glycol with lead tetra acetate and per iodic acid, pinacol-pinacolone rearrangement, preparation of glycerol from propene, synthesis and uses of nitroglycerine, composition and uses of dynamite and cordite, distinction between primary, secondary and tertiary alcohols by Lucas reagent.

**Phenols****04 hours**

Classification and nomenclature, acidic character of phenol compared to alcohol and cyclohexenol, mechanism of Fries rearrangement, Claisen rearrangement, Elbs persulphate oxidation and Lederer-Manasse reaction, synthesis and uses of n-hexyl resorcinol and picric acid, structure and uses of dettol.

**Organometallic compounds****02 hours**

Synthesis of methyl magnesium iodide and its synthetic applications in the preparation of alcohols(primary, secondary and tertiary) aldehyde, ketone, ester, carboxylic acid, amines and alkanes.

Organo-lithium compounds: Preparation of Lithium dialkylcuprate and synthesis of higher alkane from it.

**PHYSICAL CHEMISTRY****Colligative properties****07 hours**

Raoult's law, concept of lowering of vapour pressure, elevation of boiling point, depression in freezing point and osmotic pressure, derivation of  $K_b$  and  $K_f$  by thermodynamic treatment, experimental determination of molecular weight by - Landsberger's method, Beckmann's method, Berkely and Hartley method. Numerical problems.

**Infrared spectroscopy****03 hours**

Principle, types of vibrations, identification of following organic compounds by stretching frequencies-Alkanes, alkenes, alkynes, benzene, aldehydes, ketone, alcohol, thiols, acids, esters, amines, problems based on molecular formula and stretching frequency.

**Second law of thermodynamics****10 hours**

Statement, cyclic process, Carnot's cycle, heat engine and its efficiently, Carnot's theorem, entropy and its significance, entropy changes in reversible and irreversible process for ideas gases, free energy, dependence of free energy on pressure and temperature, Gibb's-Helmholtz equation, Clausius-Clapeyron equation and its applications, problems on above, partial molal quantities, chemical potential of on ideal gas.

## REFERENCE BOOKS

### **Inorganic chemistry**

- |                                  |                            |
|----------------------------------|----------------------------|
| 01. Advanced Inorganic Chemistry | Gurdeep Raj                |
| 02. Basic Inorganic Chemistry    | Alber Cotton and Wilkinson |
| 03. Inorganic Chemistry          | James Huheey               |
| 04. Modern Inorganic Chemistry   | R.D. Madan                 |
| 05. Inorganic Chemistry          | J.D. Lee                   |

### **Organic chemistry**

- |                                 |                   |
|---------------------------------|-------------------|
| 01. Organic Spectroscopy        | P.S.Kalsi         |
| 02. Organic Spectroscopy        | Y. R. Sharma      |
| 03. Organic Chemistry           | I.L. Finar, Vol-I |
| 04. Synthetic Organic Chemistry | Gurdeep Chatwal   |

### **Physical chemistry**

- |                        |   |
|------------------------|---|
| 01. Physical Chemistry | Puri and Sharma                         |
| 02. Physical Chemistry | P.L. Soni                               |
| 03. Physical Chemistry | Roberty A. Alberty                      |
| 04. Physical Chemistry | M. V. Sangaranarayanan and V. Mahadevan |
| 05. Physical Chemistry | Atkins                                  |
| 06. Physical Chemistry | Bahl, Madan and Tuli                    |

**B.Sc. III SEMESTER  
CHEMISTRY PRACTICALS**

Total number of hours per week: 04

Internal Assessment=10 Marks

Total No. of hours per Semester: 52

Practicals: 40 Marks

**A. Physical Chemistry Experiments (Non-instrumental)**

01. To study the effect of acid strength on hydrolysis of methyl acetate using HCl and  $\text{H}_2\text{SO}_4$ .
02. a) To determine the rate constant of second order reaction  
 $\text{KI} + \text{K}_2\text{S}_2\text{O}_8$  (a=b)  
b) Effect of concentration on rate constant of second order reaction.
03. Adsorption of acetic acid on animal charcoal.
04. a) Determination of surface tension and parachor of benzene series.  
b) Determination of surface tension and parachor of alcohol series.
05. Determination of viscosity of liquids of Ostwald's method.
06. Determination of viscosity of binary liquid mixtures and finding the percentage composition unknown.
07. To study distribution of iodine or benzoic acid between water and benzene.
08. Determination of equilibrium constant of distribution of iodine between KI and  $\text{CCl}_4$ .
09. Determination of molecular weight of urea by Landbergers method.
10. Determination of degree of dissociation of KCl by Landbergers method.

## 4. COMPUTER SCIENCE (Optional)

W.E.F – 2018-19

### 17BScCSCT31: Digital Logic and Computer Design

Teaching Hours: 4 Hrs/week

Marks: Main Exam: 80

IA: 20

Objectives. To provide understanding of the basic principles of digital computers.

Expected Learning Outcomes:

- 1) Students will understand how computer systems work and its underlying principles
- 2) Students will understand the basics of digital electronics

#### UNIT I

10Hrs

Digital Systems and Binary Numbers: Digital Systems, Number systems and base conversions, Representation of signed Binary Numbers, Binary codes, binary logic.

#### UNIT II

10Hrs

Boolean Algebra: Introduction to Boolean Algebra, Axioms and Laws of Boolean Algebra, Boolean functions, Canonical and Standard Forms.

Gate – Level Minimization: The Map method, Two, Three, Four Variable K-map's, Don't Care Conditions, NAND and NOR implementation, Exclusive OR function.

#### UNIT III

10Hrs Combinational Logic: Combinational logic circuits, analysis and design procedure, Binary adder and subtractor, decimal adder, binary multiplier, Magnitude comparator, Decoders, Encoders, Multiplexers.

#### UNIT IV

10Hrs

Synchronous Sequential Logic: Sequential circuits, Latches, Flip Flops, SR, JK, T, D Flip Flops, Flip Flop excitation tables.

Registers and Counters: Registers, Shift registers, Ripple counters, Synchronous counters, Other counters.

Memory and Programmable Logic : Random access memory, memory decoding, error detection and correction, Read-Only memory, Programmable logic array, Programmable array logic, sequential programmable devices.

**References:**

1. M. M. Moris and Michael D. Ciletti, Digital Design, 5<sup>th</sup> Edition, Pearson.
2. M. Moris Mano, Digital Logic and Computer Design, 4th Edition, Pearson.
3. Paul Malvino, Digital Principles and Applications by Leach, 57th Edition, Tata McGrawHill.

**Additional Reading:**

4. Charles H.Roth, Fundamentals of Digital Logic Design, 5th Edition, Cengage
5. G.K. Kharate, Digital Electronics, Oxford University Press
6. A. Anand Kumar, Switching Theory and Logic Design, 2nd Edition, PHI.

**17BScCSCT32: Programming Lab- Digital Logic**

**Practical Hours: 4 Hrs/week**

**Marks: Main exam: 40**

**IA: 10**

1. For the following functions, construct a truth table and draw a circuit diagram.
  1.  $y(A,B) = (AB)' + B'$
  2.  $y(A,B,C) = (A + B)' C$
  3.  $y(A,B,C) = (AC)' + BC$
  4.  $y(A,B,C) = (A \oplus B)C'$
  5.  $y(A,B) = A' + B$
  6.  $y(A,B,C) = ((A+B)'(B+C))'$
2. Study and verify the truth table of various logic gates
  - NOT, AND, OR, NAND, NOR, EX-OR, and EX-NOR
3. Simplify Boolean expressions and realize it.
4. Verification of Boolean Theorems using basic gates.
5. Design a 4-input NAND gate using two 2-input NAND gates and one 2-input NOR gate. Hint: Use DeMorgan's law
6. Construct the K-map for each of the following functions
  - (a)  $f(A,B,C) = AB + A'BC' + AB'C$
  - (b)  $g(A,B,C) = A'C + ABC + AB'$

$$(c) h(A,B,C,D) = A'BC' + (A \oplus B)C + A'B'CD' + ABC$$

7. For  $g(A,B,C) = A'C + ABC + AB'$ , design the circuit for the minimal SOP expression found in problem 4 using just NAND gates and inverters. Label the pinouts on the circuit diagram. Build the circuit and demonstrate the working circuit.
8. For the functions listed below, construct a K-map and determine the minimal SOP expression.
  - a.  $f(a,b,c) = a'b'c' + a'bc' + abc' + abc$
  - b.  $g(a,b,c) = ab'c' + abc' + abc + \text{don't cares}(a'bc + ab'c)$  Build the circuit required for (b).
9. Design and verify a half/full adder
10. Design and verify half/full subtractor
11. Design a 4 bit magnitude comparator using combinational circuits.
12. Design and verify the operation of flip-flops using logic gates.
13. A two bit counter is to be built that will count forward,  $00 \rightarrow 01 \rightarrow 10 \rightarrow 11 \rightarrow 00$ , when a logical input is set high and counts in reverse order when it is low.
  - (a) Draw the state transition diagram for this state machine.
  - (b) Assuming a state machine were to be built using D flip-flops, determine the value of the next state for each of the flip-flops.
14. Verify the operation of a counter.
15. Verify the operation of a 4 bit shift register
16. Using SPIM, write and test an adding machine program that repeatedly reads in integers and adds them into a running sum. The program should stop when it gets an input that is 0, printing out the sum at that point.
17. Using SPIM, write and test a program that reads in a positive integer using the SPIM system calls. If the integer is not positive, the program should terminate with the message "Invalid Entry"; otherwise the program should print out the names of the digits of the integers, delimited by exactly one space. For example, if the user entered "128," the output would be "One Two Eight."
  - Any open source simulator like Logisim (<https://sourceforge.net/projects/circuit/>) can be used.
  - SPIM is a self-contained simulator that will run MIPS R2000/R3000 assembly language programs. (Available at <https://sourceforge.net/projects/spimsimulator>)
  - Any other simulator can be used for performing experiments.
  - Breadboards may be used to realize logic gates

## 5.ELECTRONICS (Optional)

### SEMESTER –III

w.e.f – 2018-19

Total Teaching hours: 50, Teaching hours per week : 4 hours

### ELE -3 OSCILLATORS , OP AMP & NETWORKS

#### UNIT – I: OSCILLATORS

Concept of feedback. Derivation of Transfer gain with feedback. Types of feedback - positive & negative feedback. Effect of negative feedback on gain, input impedance, output impedance, distortion, noise and bandwidth(qualitative).Positive feedback, Basic principle of oscillators – tank circuit Barkhausen criterion for sustained oscillations - **L.C. Oscillators:** Hartley & Colpitt's, **RC oscillators:** Phase shift oscillator and Wienbridge oscillator determination of frequencies in each case.

8Hrs.+2Hrs.Problems =10hrs

#### UNIT – II: OPERATIONAL AMPLIFIER

Qualitative study of Differential Amplifier, four modes of Differential Amplifier, Basic information of Op-amp (Types of IC Manufactures designations Package Types, Temperature ranges and pin identifications etc.), block diagram of Op-amp, ideal version of operational amplifier. Op-amp as inverting & non-inverting amplifier (open loop), Operational amplifier parameters input offset voltage, input offset current, input bias current, Total output offset voltage Thermal drift, CMRR and Slew Rate Explanation of voltage offset null circuit for 741. Concept of virtual ground. Voltage series (non-inverting) and Voltage-shunt (Inverting) negative feedback circuits derivation of voltage gain input resistance, output resistance bandwidth and Total output offset voltage.

8Hrs.+2Hrs.Problems =10hrs

#### UNIT – III: APPLICATIONS OF OP-AMPLIFIER

Opamp adder, Subtractor. Current to Voltage converter and Voltage to Current converter circuits, Low voltage DC voltmeter, Integrator, Differentiator, Qualitative study of op-amp as comparator. Peaking amplifier.

Active filters(first order only). ; Design and study of low-pass and high-pass,

Qualitative study of IC- 555 Timer and its use in monostable and astable multivibrator.

8Hrs.+2Hrs.Problems =10hrs

## UNIT – IV : LAPLACE TRANSFORMATION

Singularity functions and it's LT. Properties of Laplace transformation (Linearity, Scale Changing, Differentiation, integration and initial and final value theorems)

**Inverse Laplace transform:** method of residues Heavyside formula. Applications of Laplace transform to solve simple differential equations and electrical network problems.

8Hrs.+2Hrs.Problems =10hrs

## UNIT – V : NET WORK SYNTHESIS

Introduction, Positive real functions, Conditional tests for positive real functions Properties of Positive Real functions, Hurwitz Polynomials and elementary synthesis procedure for RL and RC networks with use of Fosters and Cauer's type of realization.

8Hrs.+2Hrs.Problems =10hrs

### Reference Books:

1. Electronics theory and Applications - S.L Kakani and K.C.Bhandari.
2. Electronics fundamentals and applications -D.Chattopadhyayand  
P.C.Rakshit
3. Principles of electronics - B.V.Narayana Rao Vol –III
4. Electronics Devices and circuits - David.A.Bell 4<sup>th</sup> edition
5. Operational Amplifier and Linear Integrated circuits - Ramakant A Gaykawad
6. Linear Integrated circuits -D.Roy Choudhary and S Jain
7. Op-amp and Linear Integrated circuits - Coughlin & Drischoll
8. Network Analysis M.E.Van Velkenburg, PHI Pub
9. Network Synthesis M.E.Van Velkenburg, PHI Pub
10. Circuits and networks Analysis and Synthesis A Sudhakar and SP.Shymmohan TMH, Pub

## LIST OF EXPERIMENTS

Lab – 3:

Each experiment is of four hours duration. Minimum EIGHT experiments are to be performed in the semester course

1. Hartley oscillator
2. Phase shift oscillator
3. Collpitt's oscillator
4. Study of Operational amplifier Parameters
5. Inverting op-amp ( ac / dc for determination of gain).
6. Non-inverting op-amp ( ac / dc for determination of gain).
7. Op-amp as Adder and Subtractor ( dc only).
8. Op-amp as integrator
9. Op-amp as Differentiator
10. IC 555 as astable multivibrators
11. IC 555 as monostable multivibrators
12. Low voltage DC Voltmeter using op-amp
13. Op amp as peaking amplifier
14. Op amp as low pass/ high pass filter

## 6. Geography (Optional)

B. A. / B. Sc SEMESTER GEOGRAPHY (OPTIONAL)

COURSE STRUCTURE (SCHEME) UNDER CBSE SYSTEM

WITH EFFECT FROM 2015-2016 ON WARDS

Sem.	Title of the Paper	Teaching Hours	Marks	Internal Assessment	Total Marks	Duration of
		per Week		Marks (IA)		Examination
III	Theory Paper – III	05	80	20	100	3 hours
	Regional Geography of Karnataka					
	Practical Paper - III	04	40	10	50	4 hours
	<i>Interpretation of SOI Topographical Maps</i>					

### REGULATION AND SCHEME OF INSTRUCTIONS

Regulations governing three years Semesterized, Bachelor Degree Programmes of Rani Channamma University, Belagavi (framed under Section 44(1) (c) of the K.S.U. Act 2000) and on par with CBSE with the effect from 2015-16 onwards.

#### **I. Goals & Objectives:**

The following aims have been kept in view while designing the syllabus of Bachelor's Degree Programme (B.A/B. Sc) in Geography as one of the optional subject.

1. To bring the geographical awareness among the students.
2. To provide a fundamentals of spatial information of the earth surface.
3. To train promising learners to teach geography effectively at various levels in the educational institutions.
4. To train and provide information related to spatial and regional level of planning.
5. To provide adequate geographical knowledge and skills as needed for the competitive examinations.
6. Organizing the professional tours for every year to cultivate research culture among the students.

## II. Admission Criteria:

A candidate should have passed PUC/10+2 with Geography as one of the subject is eligible to choose Geography as one of the optional subjects at the under Graduate Course. The candidate should have obtained at least 40 per cent of marks in Geography as well as aggregate marks. Relaxation in respect of SC/ST etc will be followed as per the prevailing rules of the university. Other rules for admission are as per the university notification from time to time.

## III. Medium of Instruction:

The medium instruction shall be English, however, the student's are allowed to write the examination in Kannada Medium.

## IV. Attendance:

A minimum of 75% of attendance in each semester (both theory and practical) is compulsory.

## V. Scheme of Instruction:

1. The M.A/M.Sc Master's Degree holders in Geography can only teach the subject at UG Level.
2. Geography as an optional subject at Under Graduate (UG) Level, which consists of six semesters, it includes eight *theory* papers and *eight practical* papers. There will be **one theory** paper and **one practical** paper in the each semester **i.e. Ist, IInd, IIIrd, and IVth semesters**. Whereas in the **Vth and VIth** semesters, there will be **two theory papers** and **two practicals** each of **100 and 50 marks** respectively. The duration of teaching hours for the theory paper will be **five (05) hours per week** and the duration of teaching hours for practical *paper will be four (04) hours per week* in each semester. Each theory paper will have 5 modules/units (divided into chapters/units). The duration of each semester is being 16 weeks excluding examination period.
3. The Practical's are to be conducted in separate batches. Each batch consists of 15 students with one teacher, for 16-27 students with two teachers. In case, if student number is below 15 is also considered as one batch with one

teacher. Each batch (depends on the number of students) must be supervised by one/two teachers for giving instructions, supervision of practical's and correction of journal/records.

#### **VI. Scheme of Theory Examinations:**

1. Theory course shall carry 100 marks of which 80 marks allotted for semester end examination and 20 marks for internal assessment (IA) that will be carried out as per the university norms.
2. Each theory course will have a question paper of 3 hours duration and the maximum of 80 marks. Minimum marks to pass in each paper of theory are 40 percent.
3. There shall be three sections in every theory question papers viz. A. B. & C. **Section A** shall have 12 questions of each 2 marks and candidate have to attempt 10 questions only (10X2=20 marks). **Section B** shall have 8 questions of each 5 marks and the candidate have to attempt 6 questions only (6X5=30 marks). **Section C** shall have 6 questions of each 10 marks and the candidate has to attempt 3 questions (3X10=30 marks).

#### **VII. Scheme of Practical Examination:**

1. Each practical course shall carry 50 marks of which **10 marks** are allotted for IA marks (out of which **07 marks** are kept for practical records (assignments)/journals and **03 marks** allotted for attendance). The **40 marks** examination will be conducted at the end of each semester, out of which **5 marks** will be kept for viva and **35 marks** for written examination as per the instruction given by the university.
2. Each practical course will have a question paper of 4 hours duration and the maximum of 40 marks.
3. The practical examination is to be conducted in batches and each batch consists of minimum of 15 candidates.
4. There will be one internal examiner and one external examiner to conduct the practical examination for each batch in each semester.
5. Minimum marks to pass in each paper of practical are 40 percent.
6. Each candidate shall complete the laboratory work of the journal/practical records, it shall be certified and signed by both the concerned course teacher and the Head of the Department of Geography of the concerned college, to the effect that the candidate has completed the prescribed course in practical satisfactory and same should be produced at the time of practical examination. No students shall be allowed for the examination without completed journal/practical records.
7. There is no provision for seeking improvement in practical paper examination and internal assessment marks.

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**B. A. / B. Sc SEMESTER GEOGRAPHY (OPTIONAL)**

**COURSE STRUCTURE (SCHEME) UNDER CBSE SYSTEM**

**WITH EFFECT FROM 2016-2017 ON WARDS**

**THEORY AND PRACTICAL PAPER- III AND IV**

Semester	Title of the Paper	Teaching	Marks	Internal	Total	Duration
		Hours		Assessment		
		per Week		Marks (IA)		of Examination
III	<b>Theory Paper – III</b> Regional Geography of Karnataka	05	80	20	100	3 hours
	<b>Practical Paper - III</b> <i>Interpretation of SOI</i> <i>Topographical Maps</i>	04	40	10	50	4 hours
IV	<b>Theory Paper – IV</b> Population Geography	05	80	20	100	3 hours
	<b>Practical Paper - IV</b> <i>Cartographic Representation of</i> <i>Geographical Data</i>	04	40	10*	50	4 hours

(\* Note: Practical IA includes: 02+03+05 Marks for Assignment, Attendance & Journals only)

## B. A. /B. Sc. SYLLABUS IN GEOGRAPHY

### SEMESTER – III

### THEORY PAPER-III

### REGIONAL GEOGRAPHY OF KARNATAKA

**Objectives:** To understand the Karnataka regions in terms of various physical divisions, their important characteristics and intra-regional disparities in agriculture and industries and to analyze natural and human resource endowments and their conservation and management. The main purpose of this paper is to gain knowledge and understand regional strength of the region and to motivate the students for competitive exams.

**Course Structure:** One Theory and One Practical

**Teaching Theory:** 05 hours per week

**Practicals** : 04 hours per week.

**Examination** : One Theory paper of 80 Marks and 20 Marks for internal assessment (IA)  
One Practical of 40 Marks and 10 Marks for internal assessment (IA) (out of 10 IA marks 7 marks for practical record and journal and 3 marks for attendance).

Units	Topic	Teaching Hours
I	Karnataka : Location and Extent, Physical divisions, Drainage, Climate, Soils and Natural Vegetation.	16
II	Water Resource and Irrigation: Types of irrigation and River projects- Krishna, Cauvery and Tungabhadra. Agriculture: Importance of Horticulture and Floriculture. Cultivation, production and distribution of Jowar, Rice, Groundnut, Sugarcane, Cotton, Tea and Coffee.	12
III	Mineral Resources: Distribution and Production of Iron ore, Manganese and Bauxite. Hydel and Thermal Power Plants. Industries: Location Factors of Industries, Distribution and Production of Iron and Steel, Sugar, Cotton and Paper industry in Karnataka.	12
IV	Transport: Road, Railway and Air, Major Ports of Karnataka.	10
V	Population – Growth and Density of Population. Urbanization: Meaning, Trends of Urbanization in Karnataka. Tourism: Meaning, Significance and major tourist centers in Karnataka. Location of the following important elements on the given map- hills, rivers, soils, river projects, roads, towns and tourist centers. ( <b>Note:</b> Staff in charge should supply the outline map of Karnataka and train the students and it has to be treated as compulsory question in semester end examination.)	10
	<b>Total</b>	<b>60 hours</b>

#### Reference:

1. Karnataka State Gazetteer: Volume I & II
2. P. Mallappa: Geography of Karnataka ((English & Kannada Version)
3. Misra R.P: Geography of Mysore State
4. NBK Reddy and Murthy G.S: Regional Geography of Mysore State

5. Ranganath: Regional Geography of Karnataka (English & Kannada Version)  
 6. Nanjannavar S. S: Geography of Karnataka. (English & Kannada Version)  
 7. Abstract of Karnataka State: published by Bureau of Economic and Statistics, Bangalore

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## B. A. /B. Sc. SYLLABUS IN GEOGRAPHY

### SEMESTER – III

#### PRACTICAL PAPER - III

#### INTERPRETATION OF SOI TOPOGRAPHICAL MAPS

Units No.	Topic	Teaching Hours
I	<b>SOI Toposheets:</b> Meaning and its importance, Indexing of SOI Toposheets, Marginal Information of Toposheets and Conventional signs and symbols used in Toposheets.	10
II	Theoretical background for the identification and interpretation of various features mainly (without supplying the toposheets)  a) Landforms- mountains, plains and plateaus b) Drainage- trellis, dendritic, parallel, radial and dispersing c) Natural Vegetation- trees, jungles, forests and its types d) Settlements- nucleated/compact, dispersed/scattered, linear and radial patterns. e) Transport- types of roads, railways and air.	10
III	a) Detail interpretation of given SOI Toposheets of the following features: (at least each of one exercise) 1. Relief 2. Drainage 3. Vegetation 4. Settlements 5. Means of communication 6. Irrigation and Land use b) Over all Interpretation of given SOI Toposheets (at least two exercise)	16
IV	Drawing of cross section and calculation of Vertical Exaggeration (at least three exercises).	04
V	Viva	--
	<b>Total</b>	<b>40 hours</b>

**References:**

1. R.L.Singh- Elements of Practical Geography
2. Gopal Singh- Practical Geography
3. Dr. Ranganath - Practical Geography : ( Kannada)
4. Singh and Kanoj- Practical Geography
5. R.P.Misra and Ramesh- Practical Geography :Fundamental of Cartography
6. M.F.Karenavar & S.S.Nanjannavar.- Practical Geography : ( Kannada)
7. B.S.Negi.- Practical Geography
8. Pijushkanti Saha & Partha Basu- Advanced Practical Geography.

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**B. A. / B. Sc. III Semester (CBSE)**

**PATTERN/MODEL OF THEORY QUESTION PAPER**

**Paper-III: Regional Geography of Karnataka**

**Time: 3 Hours**

**Max.**

**Marks: 80**

**Instructions: 1. Attempt all sections**

**2. Wherever necessary draw diagrams and maps.**

**SECTION-A**

**(2 x  
10 = 20 marks)**

**Note: 1) Answer any Ten questions.**

**2) Answer should not exceed 50 words**

**3) Each question carries two marks.**

1	
2	

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12	

**SECTION-B**

**(5x 6= 30 marks)**

**Note: 1) Answer any Six questions.**

**2) Answer should not exceed 200 words**

**3) Each question carries five marks.**

13	
14	
15	
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17	
18	
19	
20	

**SECTION-C**

**(10 x 3 = 30 marks)**

**Note: 1) Answer any Three questions.**

**2) Answer should not exceed 500 words**

**3) Each question carries Ten marks.**

21	
22	
23	
24	
25	

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MODEL OF PRACTICAL QUESTION PAPER

**Practical Paper- III: Interpretation of SOI Topographical  
Maps**

Center No :.....

Max. Marks: 40

Seat No : .....

Date:.....

Time : 3 Hours

Instructions:

1. Attempt all questions.
2. This question paper should be attached with the main answer book.
3. Examiner should prepare the question paper covering each unit of the syllabus.

<b>Q. No. 1</b>	Selection of questions based on the Unit-I  (each question carry 2 marks)	<b>6 marks</b>  <b>(2X3)</b>
	a)	
	b)	
	c)	
<b>Q. No. 2</b>	Selection of questions purely based on the Unit-II  (Note; Questions are related to identification and methods of explaining the physical and cultural features with symbols)	<b>6 marks</b>
	a)	

	b)	
<b>Q. No. 3</b>	Selection of questions purely based on the Unit-III  Candidates are to be interpreting the physical and cultural features for the given toposheet.	<b>12 marks</b>
<b>Q. No. 4</b>	Drawing of cross section for given XY line and calculate the Vertical Exaggeration	<b>5 marks</b>
<b>Q. No. 5</b>	Viva	<b>5 marks</b>
<b>Total</b>		<b>40 marks</b>

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## 7. GEOLOGY (Optional)

### SYLLABI FOR B.SC.III & IV SEMESTER GEOLOGY (OPTIONAL)

w.e.f 2018-19

. No.	Paper Code	Title of the Paper	Marks			Exam Time	Inst. Hrs/ week
			Theory/ Practical	Internal	Total		
<b>B.Sc Semester III</b>							
1.	UG-GEOL- III	PETROLOGY	80	20*	100	3 hrs	5
2.	UG-GEOL-PR-III	PRACTICAL : STUDY OF ROCK HAND SPECIMEN AND PETROGRAPHY	40	10**	50	4 hrs	4
<b>B.Sc Semester IV</b>							
3.	UG-GEOL-IV	A. PALEONTOLOGY; B. PRINCIPLES OF STRATIGRAPHY & INDIAN STRATIGRAPHY	80	20*	100	3 hrs	5
4.	UG-GEOL-PR-IV	Practical II : STUDY OF FOSSILS; and INDIAN STRATIGRAPHY (Locations in Map)	40	10**	50	4 hrs	4
Internal Assessment: Theory Internal 20 marks covers: Two theory tests; One Practical internal test of 10 marks.							

- a) **Student batch:** As this is a semi technical and at present available only at GSS College, each batch should consist of not more than 10 students for the regular practical.
- b) **Study Tour:** There will be a Geological Study Tour to the places of geological interest mainly to study the field occurrence of geological features. It carries weightage in the final practical marks. Each student shall submit a consolidated study tour report along with the journal.
- c) **Practical Record:** Submission of a well-maintained Journal of the Practical Work done during the semester is necessary before the Practical Examination.
- d) **Assignments:** The students will be given assignments, which are to be submitted during the practical examination.
- e) **Attendance:** All the students need to attend and maintain 75% minimum.

All this carries 10 marks including viva-voce.

## NATURE OF THEORY AND PRACTICAL EXAMINATION

### a) Theory Examination: (Total 100 Marks)

i) There will be one theory paper of 80 marks in each semester.

Each paper will contain THREE Sections, which are to be written in the same answer book.

**PART A:** TWELVE Questions (Definitions/two sentence answers) numbered 1-12, each of 2 marks. Students need to answer ANY TEN questions. (2x10 = 20 Marks)

**PART B:** SIX Questions (Short answers) numbered as 13,14,15,16,17 & 18. Each of FIVE marks students need to answer ANY FOUR questions (4x5 = 20 Marks)

**PART C:** FIVE Questions (Descriptive answers) numbered 19,20,21,22 & 23. Each of TEN marks, students need to answer ANY FOUR questions (4x10 = 40 Marks)

ii) **The remaining 20 marks** are allotted for Internal Assessment Marks – of 1 hour 15 minutes **for two internal tests** in theory.

a. Two internal tests of 20 marks each reduced to 10 marks.

b. Internal Assignment/Seminars/Student project work/Viva-voce (10 marks): Students are given assignments/seminars on the subject taught or a student project work.

### b) Practical Examination: Total 50 Marks.

a. Practical examination will have 3 or 4 Questions of **30 marks**.

b. Practical Record (Journal), Field study tour report and Viva Voce carry (**10 marks**).

c. Practical Internal test: One internal test of 20 marks reduced to 10. (**10 marks**).

**B.Sc GEOLOGY (OPTIONAL)**  
**PETROLOGY AND ENVIRONMENTAL GEOLOGY**

Max. Marks: 80

Total teaching hours: 50 (4 hrs/week)

UNIT	TOPIC	Hrs
I	<p><b>Introduction-</b> Classification of rocks into igneous, sedimentary and metamorphic. Rock Cycle.</p> <p><b>Igneous Petrology:</b></p> <p><b>Magma-</b> Definition, Assimilation, Differentiation and Crystallization. Composition- acidic and basic magma. Mode of occurrence of igneous rocks: Intrusive and extrusive igneous rocks.</p> <p><b>Forms of Igneous rocks-</b> Concordant – sill and lacolith; Discordant – dyke and batholith.</p>	10
II	<p><b>Textures in igneous rocks:</b> Definition. Crystallinity, granularity, shape of the crystal, mutual relationship.</p> <p><b>Equigranular texture:</b> Panidiomorphic, hypidiomorphic, allotriomorphic;</p> <p><b>Inequigranular texture:</b> Porphyritic, poikilitic, ophitic/subophitic, basaltic (intersertal-intergranular); <b>Intergrowth texture:</b> graphic, <b>Directive structure:</b> Flow/trachytic. Other textures – Myrmekitic, Corona/reaction rim and Perthitic.</p> <p><b>Classification of igneous rocks:</b> Chemical classification- CIPW, Shand and Holmes, based on silica content (acidic, basic, intermediate and ultrabasic). Mineralogical classification- color index (leucocratic/felsic and melanocratic/mafic); Mineral content in rock: essential, accessory and secondary minerals.</p> <p><b>Bowens Reaction Series –</b> Discontinuous and Continuous</p>	10
III	<p><b>Sedimentary Petrology:</b></p> <p><b>Introduction:</b> Weathering, transportation, deposition, lithification and diagenesis.</p> <p><b>Structures of sedimentary rocks:</b> stratification, lamination, graded bedding, cross/ current bedding, ripple marks, mud cracks/sun cracks, rain prints and oolitic. <b>Textures of sedimentary rocks:</b> Clastic and non clastic. Wentworth grain size classification. Sphericity and roundness.</p> <p><b>Classification of sedimentary rocks:</b> Based on origin: Clastic/mechanical deposits and Non clastic deposits - residual, evaporites and non-evaporates/chemical and organic deposits; based on grain size- Rudaceous, arenaceous and argillaceous.</p>	10
IV	<p><b>Metamorphic Petrology:</b></p> <p><b>Introduction:</b> Agents of metamorphism- Temperature, pressure and chemically active fluids. Stress and anti-stress minerals.</p> <p><b>Types of metamorphism with brief descriptions:</b> Cataclastic, thermal, dynamothermal, plutonic metamorphism.</p> <p><b>Metasomatism-</b> Neosome and Metasomes, Migmatites.</p>	10
V	<p><b>Textures and Structures in Metamorphic rocks:</b> Crystalloblastic, palimpsest. Cataclastic, granulose, gneissose and schistose.</p> <p><b>Metamorphic Facies:</b> Facies Concept and zones. Eskola's facies</p>	10

**PRACTICAL**  
**14BSCGEOLP11**

PETROLOGY

**Max. Marks: 40**

**Time: 4 hrs/week**

**Total 50 hrs**

1. **Megascopic Structures:** (i) **Igneous rocks:** vesicular, amygdaloidal, columnar, pillow.  
(ii) **Sedimentary-** Stratification, lamination, graded bedding, cross/current bedding, ripple, mud cracks, oolitic, Granulose, schistose, gneissose and slaty cleavage.
2. **Megascopic study of Rocks:** i) **Igneous:** Granite, Syenite, Diorite and their porphyry; Pegmatite; Dolerite, Basalt, Pumice. (ii) **Sedimentary:** Breccia, Conglomerate, Sandstone, Limestone, Shell/fossiliferous limestone. (iii) **Metamorphic:** Marble, Schist (Mica, Garnet), Quartzite, Gneiss (Banded & Augen).
3. **Study of Textures in thin section:** i) **Igneous:** Equigranular- Panidiomorphic, Hypidiomorphic, Allotriomorphic, Porphyritic, Poikilitic, Ophitic/Sub-ophitic, Basaltic (Intergranular/Intersertal), Graphic.  
ii) **Sedimentary:** Clastic, Non Clastic, Oolitic  
iii) **Metamorphic:** Granulose, Schistose, Gneissose
4. **Study of Rocks in thin section:** i) **Igneous:** Granite, Syenite, Diorite and their porphyry; Pegmatite; Dolerite, Basalt, Pumice.  
(ii) **Sedimentary:** Breccia, Conglomerate, Sandstone, Limestone, Shell/fossiliferous limestone  
iii) **Metamorphic:** Marble, Schist (Mica, Garnet, Chlorite), Quartzite, Gneiss (Banded and Augen).

**TEXT BOOKS**

1. Principles of Petrology - By G. W. Tyrrell, B.I.Publications Pvt. Ltd. Mumbai.
2. Igneous and Metamorphic Petrology - By Turner and Verhoogen
3. Igneous and Metamorphic Petrology - By Best M.G., CBS Publishers, Delhi
4. Igneous Petrology - By Mihir K. Bose
5. Igneous Petrology - By Anthony Hall
6. Metamorphic Petrology - By Turner, CBS Publishers, Delhi
7. Petrogenesis of Metamorphic Rocks - By Winkler H.G.F., Springer Verlag, Narosa Publishing House, New Delhi.
8. Petrology of Metamorphic Rocks - By Mason Roger, CBS Publishers, Delhi
9. Sedimentary Rocks - By Pettijohn, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
10. Introduction to Sedimentology - By Sengupta, S
11. Petrology - By Ehlers and Blatt, CBS Publishers, Delhi.
12. Petrography - Williams, Turner, and Gilbert, CBS Publishers, Delhi.
13. Sedimentary Petrology : an Introduction to the Origin Sedimentary Rocks by M.E.Tucker
14. Principles of Sedimentology & Stratigraphy by S.J.Boggs (2006) Pettijohn.
15. Practical Approach to Sedimentology by Roy Lindholm (1987)
16. Origin of Sedimentary Rocks by Blatt, H. Middleton, G.V., & Murry, R.C.

## 8. MICROBIOLOGY (Optional)

### Structure for Microbiology - III Sem

semester	Paper Title	Instruction Hrs per week		Examination Marks		Internal Assessment Marks		Duration of Examination Hrs		Total Marks
		Theory	Practical	Theory	Practical	Theory	Practical	Theory	Practical	
III	MIB 3.1 : Microbial Physiology and Genetics	4		80		20		3		150
	MIB 3.2 : Microbial Physiology and Genetics		4		40		10		4	

**SYLLABUS FOR MICROBIOLOGY (Optional)**  
**w.e.f 2018-19**  
**PAPER 3.1 MICROBIAL PHYSIOLOGY AND GENETICS**

**Total hours allotted-50**

**Part-A Microbial Physiology.**

**Total hours allotted-25**

**1. Biomolecules**

Classification and importance of Carbohydrates, Proteins, & Lipids.

**2- Hours**

**2. Enzymes**

Nomenclature, classification, properties, mechanism of action and factors affecting enzyme activity, competitive and non competitive inhibition and allosteric enzymes, cofactors, coenzymes, Ribozymes and their importance, clinical importance of enzymes.

**4- Hours**

**3. Microbial Nutrition**

Nutritional requirements, modes of nutrition- Phototrophs, chemotrophs, methanotrophs, organotrophs and saprotrophs.

**3- Hours**

**4. Photosynthesis**

Types of bacterial photosynthesis, photosynthetic pigments, factors affecting rate of photosynthesis. Light & Dark reactions, Comparison of Photosynthesis in green plants & bacteria. **4- Hours**

**5. Bio-energetic**

Laws of thermodynamics, Free energy, ATP and its production. Other high-energy compounds, oxidation and reduction reaction. **2- Hours**

**6 .Energy Yielding process**

Glycolysis, Outline of TCA cycle, ETP, oxidative phosphorylation, oxidation (alpha and Omega oxidation pathway) , anaerobic respiration, Lactic & acetic acid fermentation **7- Hours**

**7. Microbial Growth**

Growth rate, generation time and growth curve-phases of growth and their significance. Physical and chemical factors affecting growth. Measurement of growth by cell number and cell mass.

**3- Hours**

## **Part –B Genetics**

**1. Mendelian concepts and classical genetics. 1-Hour**

**2. Genomic organization in Prokaryotes & Eukaryotes 2- Hours**

### **3. Nucleic Acids**

Chemical composition of DNA and RNA, Watson and Crick model of DNA, Types of DNA and RNA-A, B, H, Z. Super coiling of DNA, Extra chromosomal DNA.

**5-Hours**

### **4. DNA Replication in Prokaryotes.**

Semi-conservative method, Rolling circle model, Origin of replication, Primers and template, Replication fork, Unidirectional and Bidirectional.

**5- Hours**

### **5. Genetic Recombination in Prokaryotes.**

Requirements, Molecular basis, genetic analysis of recombination. Transformation, Conjugation and Transduction.

**4- Hours**

### **6. Mutation, Nature and types.**

Induced, Spontaneous, Biochemical basis of mutation, point mutation and Frame shift mutation. **4- Hours**

### **7. Transposable elements and Transposon.**

Mutagenesis, detection and isolation of mutants by replica plate method.

**4- Hours**

### **PRACTICAL 3.2 Microbial Physiology and Genetics**

1. Qualitative test for the detection of the macromolecules.  
Glucose- Benedict's test, Fehling's test.  
Protein – Biuret test, Ninhydrin test.  
Lipids- Emulsification and solubility test.
2. Determination of growth curve for fungi by colony diameter method.
3. Biochemical test for the identification of bacteria:
  - a) IMViC
  - b) Fermentation of Glucose, Sucrose And Lactose- acid & gas production.
  - c) Starch Hydrolysis
  - d) Gelatin Hydrolysis
  - e) Catalase test
4. Colorimetric estimation of Sugars by DNS method.
5. Colometric estimation of Proteins by biuret method.
6. Effect of PH and Temperature on bacterial growth.
7. Transformation- Griffiths experiment and Mehanisms. Transduction generalized & Specialized.
8. Demonstration of Chromatographic Separation of amino acid.

#### **REFERENCES:**

1. Wolfgang. K. Joklik (1995) Zinssers Microbiology. Mc Graw-Hill companies.1294pp.
2. Stanley. R. alloy,David Freifelder,And John .E.Crona. (1994).Microbial Genetics( 2<sup>nd</sup> Ed). Jone sand Bartlett Publishers.
3. Larry Snyder Wendy Champness.(1997) Molecular Genetics of Bacteria.ASM Pree. 672pp.
4. Alcamo, I.E. Laboratory Fundamental of Microbiology 2001. Jones and Bartlett Publishers.
5. Microbial Genetics. Maloy et.Al.1994. Jones and Bartlett Publishers.
6. Molecular Genetics of bacteria. J.W. Dale 1994. John Wiley & Sons.
7. Modern Microbial genetics.1991. Streips & Yasbin.Nile. Ltd.
8. Atlas.R.M. “Microbiology- Fundamental and Applications” Mac Millian Publishing company New York.
9. Cappucino J.C. And Shermani. N-1999 Microbiology- A laboratory manual, Adelson Wessey.
10. Colowod, D 1999, “Microbial Diversity” Academic Press.
11. Edward Aleam T.1997 “ Fundamentals of Microbiology” -5<sup>th</sup> Edn, Adilson Wesely Longaman Inc. New York.
12. Aneja K.R, Experiments in Microbiology, Plant pathology, Tissue culture And Mushroom Cultivation, New age International, New Delhi.
13. Brown,T.A. 1998 “ Genetics- A molecular Approach” 3<sup>rd</sup> edn.

## 9. MATHEMATICS (Optional)

MATHEMATICS SYLLABUS FOR THE ACADEMIC YEAR 2015-2016 ONWARDS  
B.SC III SEMESTER

### PAPER I: MATHEMATICAL LOGIC & REAL ANALYSIS

TOTAL TEACHING HOURS: 50 TEACHING HOURS PER WEEK: 05

#### UNIT-I

**Mathematical Logic:** (Recapitulation of basic definitions) tautology and Contradiction, logical equivalence, Converse, inverse and Contra-positive of an implication, Mathematical structures, Existential & universal quantifiers, methods of proofs. **10 hours**

#### UNIT-II

**Real Analysis-I:** Jacobians, Properties and examples, Lagrange's mean value theorem for functions of two variables. Taylor's (only statement) and Maclaurian's theorems for two variables. **10 Hours**

#### UNIT-III

**Real Analysis-II:** Maxima and Minima of two and three variables, Necessary and sufficient condition for extreme values of two variables, Lagrange's method undetermined multipliers. **10 Hours**

#### UNIT-IV

**Sequences-I:** Sequences. Limit of a sequences, Bounded and unbounded sequences, Convergent, Divergent, and Oscillatory sequences. Algebra of convergent sequences. Monotonic sequences. Theorems on monotonic sequences. **10 Hours**

#### UNIT-V

**Sequences-II:** Cauchy's sequences, Cauchy's first and second theorems on limits. Cauchy's criterion for convergence of sequences. Subsequences. (definition & example) **10 Hours**

#### References:i

- (1) Shanti Narayana and P K Mittal: Textbook of Mathematical analysis.
- (2) Nisha Rani and Gupta: Textbook of real analysis.
- (3) N P Bali: Real analysis(Golden Series)
- (4) J N Sharma and A R Vasistha: Real analysis.
- (5) G. K. Ranganath: A text book of College Mathematics.

## B.SC III SEMESTER

### PAPER II: GROUP THEORY, INTEGRAL CALCULUS & DIFFERENTIAL EQUATIONS

TOTAL TEACHING HOURS: 50 TEACHING HOURS PER WEEK: 05

#### UNIT-I

**Group Theory-I**: Groups, Abelian group, Standard examples of groups, Properties of groups, Semi groups, Subgroups and its properties, Permutation group. **10 Hours**

#### UNIT-II

**Group Theory -II** : Cyclic groups & its properties, Cosets. Lagrange's theorem, Euler's theorem and Fermat's theorem. **10 Hours**

#### UNIT-III

**Applications of Definite Integrals**: Application of integration for finding the lengths of arc, Surface areas and volume of solids of revolution for standard curves whose equations are given in Cartesian, polar and parametric forms. **10 Hours**

#### UNIT-IV

**Differential equation-I**: First order first degree equations: linear differential equation, Homogeneous and reducible to homogeneous forms, Bernoulli's form, Exact equations, Necessary and sufficient condition for the equation to be exact, solution of differential equation by finding a suitable integrating factor. **10 Hours**

#### UNIT-V

**Differential equation-II**: Differential equations of the first order higher degree, Solvable for  $p$ , Solvable for  $x$ , Solvable for  $y$ , Clairaut's equations reducible to Clairaut's form. **10 Hours**

#### References:

- (1) Shanti Narayana: Textbook of Integral Calculus.
- (2) Shanti Narayana: Textbook of Modern Abstract Algebra.
- (3) D. Murray: Introductory Course in Differential Equations.
- (4) Ayres F: Differential Equations.
- (5) G. K. Ranganath: A text book of College Mathematics
- (6) Herstein I. N: Topics in Algebra.

## 10. Physics (Optional)

B.Sc. III Semester  
PHYSICS(Optional)  
(w.e.f.2018-19)

Physics 3.1: GEOMETRICAL OPTICS AND ELECTRICITY I. ( Total Hours: 50 Hrs.)

SUBJECT CODE: 17BSCPHYT31

### UNIT I

#### GEOMETRICAL OPTICS:

Fermat's principle-statement and explanation, derivation of laws of reflection and refraction.

Abbe's sine rule (derivation), Lagrange and Helmholtz's relation ( derivation ). Problems.

(4 + 1 = 5 hours)

#### CARDINAL POINTS:

Cardinal points of optical system: Principal foci, principal points and nodal points. Newton's formula and graphical construction of image. Equivalent focal length of two thin lenses separated by a distance (derivation) and location of Cardinal Points. Thick lens and power of thick lens. Problems.

(4 + 1 = 5 hours)

### UNIT II

#### ABERRATIONS:

Spherical (longitudinal and lateral), chromatic (longitudinal and lateral) aberrations. Methods to reduce spherical aberration ( qualitative ) condition for Achromatism of two thin lenses in contact and separated by a distance.

Ramsden's and Huygen's eye-pieces: Construction and location of cardinal points . Problems.

(4 + 1 = 5 hours)

#### DYNAMICS OF CHARGED PARTICLES:

Charged particles in a uniform (static) electric field applied along the direction of particle motion. Energy acquired during the motion of a charged particle in uniform transverse electric field. Charged particle moving in a constant uniform magnetic field.

Problems.

(4 + 1 = 5 hours)

## UNIT III

### DIELECTRICS:

Electric polarization. Gauss law (vector form) in dielectrics and electric displacement. Boundary conditions at a surface separating two dielectric media (derivation). Relation between Electric Displacement (  $D$  ), Electric Field (  $E$  ) and Polarization (  $P$  ). Atomic Polarizability, electric susceptibility, relation between Electric constant and electric susceptibility.

Expression for mechanical stress on surface of charged conductor. Application to electrified soap bubble. Expression for electrostatic energy in a medium surrounding charged conductor. Derivation of Clausius – Mosotti equation and its limitations.

Experimental determination of dielectric constant of a solid by Hofkinsons’s Null Method.

Problems.

(8 + 2 = 10 hours)

## UNIT IV

### CURRENT ELECTRICITY

Statement of Biot – Savart’s Law, Derivation of expression for magnetic field due to a straight conductor carrying current, Mention of expression of variation of magnetic field along the axis of a circular coil, tangent law, determination of  $B_H$ . Helmholtz Galvanometer: Principle, Construction and Working.

Problems.

(3 + 1 = 4 hours)

### TRANSIENT CURRENTS

Theory of growth and decay of current through RL circuit. Theory of charging and discharging of capacitor through RC circuit. Time constants of RL and RC circuits. LCR circuit ( Discussion of special cases ). Measurement of high resistance by leakage method.

Problems.

(3 + 1 = 4 hours)

## UNIT V

### ELECTRICAL INSTRUMENTS AND MEASUREMENTS:

Ballistic galvanometer: Condition for moving coil galvanometer to be ballistic and dead beat. Theory of BG. Charge Sensitivity, volt sensitivity and current sensitivity and their relations, Determination of self inductance (  $L$  ) by Rayleigh’s method with necessary theory. Theory of earth inductor. Determination of  $B_H$ ,  $B_V$  and  $\Phi$ . **CRO lo k diagram.**

Use of CRO in the measurement of Voltage, Frequency and Phase. Problems.

(9 + 1 = 10 hours)

**PHYSICS 3.2 : LAB – III**  
**SUBJECT CODE: 17BSCPHYP32**

**LIST OF EXPERIMENTS**

1. Calibration of Spectrometer.
2. Dispersive Curve and Dispersive Power.
3. Searl's Goniometer.
4. Turn Table.
5. Determination of Magnetic Field along the axis of a coil.
6. Helmholtz Galvanometer.
7. Determination of the constants of B.G.
8. Determination of High Resistance by the Leakage method.
9. Measurement of the capacity by the method of Mixtures.
10. Use of CRO in the measurement of Voltage, Frequency and Phase.
11. Time constant by RL/RC circuits.
12. Determination of self inductance by Rayleigh's method.

**NOTE:**

1. Experiments are of Four hours duration.
2. Minimum of Eight experiments to be performed.

**REFERENCE BOOKS:**

1. Principles of Optics (I-Edition) –B.K.Mathur (New Gopal Printing Press, 1962).
2. Fundamentals of Optics (V-Edition) – Khanna and Bedi (R.Chand, New Delhi).
3. A text book of Optics (I-Edition) – Brij lal and Subramanyam (S.Chand).
4. Optics (IV-Edition) – Ajoy Ghatak (Tata McGraw Hill, 2006).
5. Fundamentals of Optics (III Edition) –Jenkins White (Tata McGraw Hill,1957).
6. Geometrical Optics (I-Edition) – D.P.Acharya (Oxford & IBH Pub. Co., 1970).
7. Optics and Spectroscopy (VI Edition) – Murugesan, Kiruthiga and ShivaPrasad (S.Chand).
8. Geometrical Optics – A. Verstraetin.

9. Fundamentals of Electricity and Magnetism – Basudev Ghosh (Books & Allied New Central Book Agency, Calcutta, 2009).
10. Electricity and Magnetism – D.N.Vasudev (S.Chand).
11. Electricity and Magnetism – B.S.Agarwal (S.Chand).
12. Fundamentals of Optics – Khanna & Gulati.
13. Electricity and Magnetism – Brij lal and Subramanyam.
14. Electricity and Magnetism and Atomic Physics (Vol-I) – John Yarwood.
15. Electricity and Magnetism – A.N.Matveer (Mir Pub., 1986)
16. Electricity and Magnetism – D.Chattopadhyay and Rakshit.
17. Electricity and Magnetism with Electronics – K.K.Tewari (S.Chand).
18. Fundamentals of Electricity and Magnetism – D.N.Vasudev.
19. Electricity and Magnetism – Sehgal and Chopra.

# 11. STATISTICS (optional)

**B.A/ B.Sc. COURSE IN STATISTICS (OPTIONAL)  
(WITH EFFECT FROM : 2018-19)  
THIRD SEMESTER: THEORY PAPER**

**Total: 50 Hours.**

## **STTH-3: SAMPLING DISTRIBUTIONS AND NON PARAMETRIC TESTS**

### **Unit: 1.Sampling Distribution and Large Sample Tests:**

Definition of population, Sample, Parameter and Statistic. Sampling distribution of  $\bar{X}$  and  $s^2$  for sample from normal distribution. Central Limit Theorem (without proof). Definition of Null and Alternative Hypothesis, Critical region, Type-I and Type-II errors and level of significance.

Large sample tests: Large sample tests-for mean and difference of means, proportion and difference of proportions.

**10 Hours.**

### **Unit: 2. Exact Sampling Distributions:**

Chi-square ( $\chi^2$ )-distribution: Definition, and derivation, Properties-moments, recurrence relation for moments and approximation to normal distribution. Independence of sample means and sample variances in random sampling from a normal distribution. Applications of  $\chi^2$  - distribution.

**10 Hours.**

### **Unit: 3 Student's 't' and Snedecore's 'F' distributions:**

Definition, and derivation Moments of student's t-distribution. Recurrence relation for moments, limiting form of t-distribution. Applications of t-distribution. Theoretical examples.F-distribution: Definition and derivation of F- distribution. Moments of F-distribution. Recurrence relation for moments. Applications of F - distribution. Statement of inter relationship between  $\chi^2$ , t and F -distributions.

**10 Hours**

### **Unit:4. Non-parametric tests:**

Order statistics – distribution of maximum and minimum statistics. Need for non-parametric tests. Advantages and dis-advantages of non-parametric methods over parametric methods. Assumptions in non-parametric methods. Sign test for quantiles, Sign test based on paired observations, Wilcoxon signed rank test for one sample and paired samples. Comparison of the sign-test and Wilcoxon signed-rank test, Man-Whitney-Wilcoxon test, Wald-Wolfowitz run test, Median test , Run test for randomness, Test for independence based on Spearman's rank correlation coefficient.

**10 Hours.**

### **Unit: 5. Multiple and Partial Correlation and Regression:**

Trivariate data, Yule's notation. Equation of the plane of regression. Residuals and their properties, residual variance. Multiple correlation and partial correlation coefficients. Derivations and their properties, standard examples.

**10 Hours**

### **THIRD SEMESTER:**

#### **STPR-3: PRACTICAL PAPER.**

1. Applications of Chi-square distribution-I: Goodness of fit.
2. Applications of Chi-square distribution-II: Independence of attributes.
3. Applications of t-distribution.
4. Applications of F- distribution.
5. Non-parametric tests-I
6. Non-parametric tests-II
7. Partial and Multiple correlation-I
8. Partial and Multiple correlation-II
9. Large sample tests.

#### **Books for study:**

1. Gupta S.C and Kapoor V.K.: Fundamentals of Mathematical Statistics- Sultan Chand & Sons' publications.
2. Hogg .R.V.and Craig.A.T(1978):Introduction to Mathematical Statistics.-4/e Macmillan .
3. Mood.A.M.,Graybill.F A. and Boes D.C.(1974): Introduction to the Theory of Statistics. McGrawHill.
4. Mukyopadhyay.P. (1996) .Mathematical Statistics.-Kolkotta Publishing House.
5. Goon AM, Gupta M.K., Das Gupta.B.(1991): Fundamentals of Statistics Vol-I World Press Kolkatta..

#### **Books for Reference:**

- 1.Rohatgi.V.K. and A.K.Md.Ehsanes Saleh (2002):An introduction to probability theory and Mathematical Statistics. John Wiley.
- 2.Murry R.Speigel (1982): Theory & Problems of Statistics, Schaum's publishing Series.
3. P.G.Hoel (1971): Introduction to Mathematical Statistics, Asia publishing house.
4. Dudewicz EJ and Mishra S.N (1980): Modern Mathematical Statistics-John Wiley.

## 11. ZOOLOGY (Optional)

### BSc III Semester Scheme (CBSC - Pattern)

#### Zoology (Optional) Syllabus(Revised)

2018 -19 Onwards

Semesters	Syllabus	Total Hours	Theory & Practical/ Week
III	Development biology, Animal Physiology & Biochemistry	50hrs.	4 hrs.
	PRACTICAL	12	4 hrs.

#### NOTE:

THEORY MARKS			PRACTICAL MARKS		
Internal	Annual	Total Marks	Internal	Annual	Total Marks
20	80	100 marks	10	40	50 marks

#### Question paper pattern for THEORY examination

Que.No.	Marks	Solve	Total Marks
I	02	10	20
II	04	05	20
III	10	04	40
<b>TOTAL --- 80 MARKS</b>			

#### PRACTICAL pattern for examination

Que.No.	Solve	Total Marks
I	Physiology(Qualitative Test)	07
II	Chick Embryo Mounting	07
III	Normal / Abnormal Urine Test	05
IV	Identification / Spotting ( Four)	08
V	Preparation of Haematin Crystals/ haemoglobin by Sahli's method	Estimation of 05
VI	Submission of Chick Embryo slides	03
VII	Journal	05
<b>TOTAL --- 40 MARKS</b>		

**B.Sc III Semester Syllabus(Revised)  
ZOOLOGY (Optional) 2018-19 Onwards**

Total Marks-80

Total Teaching-50hrs.

**Development Biology, Animal Physiology & Biochemistry**

**UNIT-I Development Biology**

Brief account of Gametogenesis and Fertilization.	<b>2hrs</b>
Types of Eggs, Cleavage patterns	<b>2hrs</b>
Development of Frog up to Gastrulation. Organizer phenomenon.	
Chick development up to 48 hours chick embryo.	<b>4hrs</b>
Placenta types Structure and Functions. Extra embryonic membranes in mammals.	<b>4hrs</b>
Human Development up to Implantation.	

**UNIT-II Animal Physiology and Biochemistry**

<b>Proteins, Carbohydrates and Lipids:</b>	<b>3hrs</b>
Definition, Classification and Biological Significance.	
<b>Enzymes:</b> IUB, Mechanism of enzyme action, specificity of Enzymes, reversibility of enzymes action and Enzyme inhibitors' brief account of coenzymes and cofactors. Clinical importance of enzymes.	<b>4hrs</b>
<b>Vitamins:</b> Water soluble vitamins (B complex and C) Fat soluble vitamins (A, D, E and K)	<b>3hrs</b>

**UNIT-III**

<b>Bioenergetics:</b> Concepts of bio-energetic. Glycolysis, Krebs Cycle & Electron Transport System.	<b>3hrs</b>
<b>Physiology of Digestion:</b> Digestion & absorption of Proteins, Carbohydrates & Fats. Balanced diet.	<b>3hrs</b>
<b>Physiology of Respiration:</b> Transport of Oxygen & Carbon dioxide, Chloride shift, Respiratory Pigments.	<b>2hrs</b>

## UNIT-IV

**Physiology of Circulation:** Structure, function & double circulation **3hrs**  
of mammalian heart. Types of Hearts-Neurogenic  
and Myogenic. Myogenic heart. Blood pressure.

**Physiology of Excretion:** Ammonotelic, Ureotelic & Uricotelic **2hrs**  
Excretion with examples. Ornithine cycle.  
Physiology of Urine formation in Man.

**Physiology of Muscle Contraction:** Ultra structure of striated **2hrs**  
Muscle. The Structure of myosin, actin, tropomyosin  
and tropionin. Mechanism of muscle contraction.  
Sliding filament theory.

**Physiology of Nervous Coordination:** Structure and propagation  
**2hrs** of nerve impulse in medullated and non medullated  
Nerve. Synaptic transmission and Neuro-muscular  
Junction. Neuro-transmitters and their importance.

## UNIT-V

**Structure & organs related to Vision, Olfaction & Audition in** **6hrs**  
Human being.

**Immunology:** Bone marrow, thymus, spleen-Payer's patches. **2hrs**  
T and B cells .Types and Significance .Antigens  
and Antibodies. Structure of Immunoglobins G (IgG)  
& Immunization.

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## PRACTICALS

	<b>Total Practical's -12</b>
1. Developmental stages of Frog up to Neural.	01
2. Developmental stages of Chick (18 hrs, 24 hrs,36 hrs,& 48 hrs)	01
3. Mounting of Chick embryo to make a permanent slide.	03
4. Qualitative tests for Glucose, Starch, Proteins, Fats and Sucrose	03
5. Qualitative tests for Normal & Abnormal constituents of Urine.	02
6. Preparation of Haematin Crystals.	01
7. Estimation of haemoglobin by Sahli's method.	01
8. Internal Practical Test.	

**NOTE:**

1. With the help of Charts/Models/Diagrams/Printouts & Xerox Sheets are used in practical's demonstration.
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## **REFERENCE BOOKS**

1. Developmental biology-Rastogi & Jay raj Publisher-Kedarnath Ramnath, Meerut.
2. Introduction to Embryology –Ballinsky
3. Foundations of Embryology – Patten
4. Principles of Embryology- Waddington C.H
5. Developmental Biology – Scott F. Gilbert
6. Developmental Biology –a modern Synthesis: K.Vasudev Rao.
7. Embryology – Mohan Arora
8. Embryology – Constructing the Organism
8. Elements of Developmental Biology: Dr P.C.Jain.
9. Vertebrate Embryology: N.N. Majumdar.
10. Essentials of Animal Physiology- Rastogi S.C.
11. Animal Physiology – Nigam H.C.
12. Animal Physiology- Agarwal et. al
13. Principles of Biochemistry- Lehninger
14. Biochemistry- Mathews, Van Holde, Ahren- Pearson Education
15. Animal Physiology: Schmidt Nielson Cambridge Uni Publications.
16. Principles of Biochemistry: Lehninger A.L. Nelson D.L. and Cox M.M. Worth.

## **GROUP - III**

### **III SEMESTER**

#### **DEVELOPMENT OF PERSONALITY AND COMMUNICATION SKILL**

**Contact Hours : 52**  
**Marks : Main Exam : 80**

**Contact/ Weekly Hours : 4**  
**Internal Assessments : 20**

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#### **Module 1 : Personality – The Introduction (11 Hrs)**

Personality meaning, dimensions/ determinants physical, Intellectual, emotional, linguistic cultural, Traits of Personality, importance of personality development, Personality development as a process.

#### **Module 2 : Personality Development (11 Hrs)**

Grooming the self, Dress code for Men and Women, Do's and Don'ts, Social etiquettes and Manners, Self-confidence – Meaning and building techniques, Willpower Increasing the Willpower for self-improvement.

#### **Module 3 : Self Analysis (10 Hrs)**

SWOT Analysis, Who am I, Attributes, Importance of Self Confidence, Creativity out of box thinking, Lateral Thinking, Johari Window.  
GOAL SETTING – Short Term, Long Term, Life Time Goals, (Personalized and organizational) Time Management Value of time, Diagnosing Time Management, Weekly Planner To do list, Prioritizing work.

#### **Module 4 : Communication and its importance (10 Hrs)**

Process of Communication, written and oral communication, process of listing body language or non verbal communication, the art of public speaking.

#### **Module 5 : Leadership as a process (10 Hrs)**

Working in a team, management of conflict, interpersonal and interpersonal intergroup, Profiles, of great personalities, Career planning and role of career planning and role of career planning in personality development, How to face personal interview and group discussion.

**References:**

1. Organisational Behaviour : By S.S. Khanaka
2. Organisational Behaviour : By Stephen Robbins
3. Organisational Behaviour : By Ashwatappa
4. Cloninger, Susan C, (2000) Theories of personality, prentice Hall London.
5. Eriksen Karin (1979) Communion skills for human services, Prentice-Hall
6. Hurlack,, Elizabeth B (?) personality Development
7. Johnson Roy Ivan (1956) Communication : Handling Idea Effectively, McGraw Hill, New York.
8. Kagan Jerome (1969), Personality Development, Harcourt Brace, New York.
9. Kundu C.L (1989) personality Development, Sterling Bangalore.

**Scheme of Instruction and Examination**

<b>Sem</b>	<b>Title of the Paper</b>	<b>Theory Hours</b>	<b>Theory Marks</b>	<b>I.A. Marks</b>	<b>Exam Hrs</b>	<b>Total Marks</b>
<b>1</b>	<b>Development of Personality and Communication</b>	<b>4 Hrs</b>	<b>80</b>	<b>20</b>	<b>1.5</b>	<b>100</b>

**Note :** The Final Examination shall be in Multiple Choice Question (MCQ)  
Equal weightage shall be given to all the modules when preparing MCQ's

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